

5. REVIEWS

The PA investigator should conduct a detailed review of the PA report and scoresheets, particularly for internal consistency, as a quality control mechanism. A second reviewer with considerable site assessment experience should then examine the package to assure consistency, and to provide an independent evaluation of PA hypotheses. The reviewer should also evaluate the package to determine if special circumstances exist where detailed analytical data and/or ground water potential to release factors could be applied to reduce the number of further action site recommendations ("false positives").

The site review assures an appropriate site disposition recommendation. For a site receiving a NFRAP recommendation, this means assuring that the judgments and data reasonably support the conclusion that the site poses little threat, or that EPA's policy is to address the site under other statutory authority. For a site receiving a further action recommendation, the review assures that the PA evaluation reasonably supports the need for further investigation. In some cases, the review may identify an opportunity to apply additional information that could result in a NFRAP recommendation.

5.1 REVIEW FOR INTERNAL CONSISTENCY

Both the PA investigator and a second independent reviewer should review the PA written products to assure internal consistency in the information and hypotheses recorded in the report and on the data summary form and scoresheets.

An important quality assurance objective is to find and correct errors of consistency. For example, primary targets are targets suspected to be exposed to contamination by a hazardous substance; also, a release must be hypothesized to score primary targets, because a target cannot be exposed to contamination unless a hazardous substance has migrated. A scenario in which the PA investigator scored primary targets without also scoring a suspected release would represent a significant inconsistency indicating either an error or a flawed conclusion. In either case, a discrepancy such as this, if undetected, could contribute to an inappropriate site disposition recommendation. Identifying such a discrepancy directs the PA investigator and site reviewer to reexamine the evaluation and resolve the apparent conflict.

The PA scoresheets contain several mechanisms that can assist the review for internal consistency:

- ! Criteria Lists (pages 7, 11, 18, 21) summarize considerations and rationale leading to hypotheses regarding suspected releases and exposure of targets. Scores assigned to likelihood of release and targets for each pathway should be consistent with conclusions drawn from the Criteria Lists.
- ! Pathway Characteristics boxes (pages 8, 12, 19, 22) summarize information for key factors to evaluate each pathway. Factor scores should be consistent with the information in the Pathway Characteristics box.
- ! Scoring Columns "A" and "B" for Suspected Release and No Suspected Release are designed to prevent assigning scores to factors that do not apply. For example, there can be no primary targets when "No Suspected Release" (Column B) is scored; therefore, the primary target boxes are shaded to restrict scoring in Column B. For each pathway, scores must appear in only one column.

- ! Waste characteristics and targets scoring tables ([PA Tables 1 through 10](#)) provide for immediate cross-checking of assigned factor values against the values and evaluations recorded in each table.
- ! The [summary questions](#) (page 24) ask for qualitative evaluations of the relative risk of targets being exposed to hazardous substances associated with the site. The identification of targets as primary or secondary should be consistent with responses to these questions.

Table 5-1 provides examples of how these mechanisms can be used to review release and target evaluations for each pathway (page numbers refer to PA scoresheets page numbers).

5.2 REVIEW OF PA HYPOTHESES

Regional EPA site assessment personnel conclude a site disposition decision based primarily on the site score. In general, sites that score 28.50 or greater receive a further action recommendation, while sites that score less than 28.50 receive a NFRAP recommendation. The PA score is most sensitive to targets values. In particular, primary targets are weighted heavily. During the PA, however, analytical data to definitively support or reject the occurrence of releases and exposure of targets may not be available; PA investigators rely on available information and professional judgment to form hypotheses on these points. As these hypotheses strongly influence the PA score, it is particularly important that they be reasonable and well-founded, both in fact and in necessary conservatism when facts are limited.

The review for internal consistency (Section 5.1) may identify inconsistencies that could question the validity of a particular hypothesis or conclusion. This review alone, however, is not sufficient. The reviewer must also evaluate the validity of each hypothesis.

The pathway-specific Criteria Lists guide the formulation of PA hypotheses. Investigators answer each question on the list and, when releases or primary targets are suspected, provide a brief statement summarizing the rationale for their hypothesis. The reviewer's function is to examine these responses and summary statements, in view of all that is known about the site, to assure that appropriate conclusions have been drawn.

Under some circumstances, experienced investigators may have differing interpretations of site conditions and make differing conclusions or hypotheses regarding the likelihood of a release and exposure of targets. Any such differences must be resolved during the review. If the reviewer's interpretations contradict the PA investigator's, the two should discuss the situation and reach a consensus. This aspect of the review identifies significant points about the site evaluation that may need detailed explanation in the PA narrative report (Section 4.2) to fully support the conclusions. Throughout the review, the PA investigator and site reviewer must keep in mind the need for conservative judgments in the absence of definitive proof to avoid underestimating the potential threat -- which could lead to an inappropriate NFRAP recommendation.

Table 5-1
Checklist for Internal Consistency

Instructions: The PA scoresheets contain several mechanisms to aid review for internal consistency. The items listed beneath each factor or factor category heading identify questions on the PA scoresheets which support the evaluation of that factor or factor category. The reviewer should check for agreement between all responses. All page numbers refer to PA scoresheet page numbers.

Ground Water Pathway

Likelihood of release

- ☐ Page 7, Criteria List, suspected release?
- ☐ Page 8, Pathway Characteristics, suspected release question
- ☐ Page 8, Likelihood of Release, item 1 or 2
- ☐ Page 8, Column A or B

If No Suspected Release is scored (all items listed above and the following):

- ☐ Page 8, Pathway Characteristics, karst terrain and depth to aquifer
- ☐ Page 8, Likelihood of Release, item 2

Primary targets

- ☐ Page 7, Criteria List, primary targets identified?
- ☐ Page 8, Likelihood of Release, item 1
- ☐ Page 8, Targets, item 3
- ☐ Page 8, Targets, item 5
- ☐ Page 8, Waste Characteristics, item 8a or 8b
- ☐ Page 24, Summary question 1

Secondary targets

- ☐ Page 8, Pathway Characteristics, distance to nearest well
- ☐ Page 8, Pathway Characteristics, karst terrain
- ☐ Page 8, Targets, item 4
- ☐ Page 8, Targets, item 5
- ☐ Page 9, PA Table 2a or 2b

Surface Water Pathway

Likelihood of release

- ☐ Page 11, Criteria List, suspected release?
- ☐ Page 12, Pathway Characteristics, suspected release question
- ☐ Page 12, Likelihood of Release, item 1 or 2
- ☐ Pages 12, 14, 15, and 17, Column A or B

If No Suspected Release is scored (all items listed above and the following):

- ☐ Page 12, Pathway Characteristics, distance to surface water and flood frequency
- ☐ Page 12, Likelihood of Release, item 2

Table 5-1 (concluded)
Checklist for Internal Consistency

Surface Water Pathway (concluded)

Primary targets

- ☐ Page 11, Criteria List, primary intake/fishery/sensitive environment identified?
- ☐ Page 12, Likelihood of Release, item 1
- ☐ Page 12, Drinking Water Threat Targets, item 4
- ☐ Page 12, Drinking Water Threat Targets, item 6
- ☐ Page 14, Human Food Chain Threat Targets, item 9
- ☐ Page 15, Environmental Threat Targets, item 12
- ☐ Page 17, Waste Characteristics, item 14a or 14b
- ☐ Page 24, Summary question 2

Secondary targets

- ☐ Page 12, Drinking Water Threat Targets, item 5
- ☐ Page 12, Drinking Water Threat Targets, item 8
- ☐ Page 13, PA Table 3
- ☐ Page 14, Human Food Chain Threat Targets, item 10
- ☐ Page 15, Environmental Threat Targets, item 13

Soil Exposure Pathway

Resident population

- ☐ Page 18, Criteria List, resident population identified?
- ☐ Page 19, Pathway Characteristics, residents question
- ☐ Page 19, Pathway Characteristics, students question
- ☐ Page 19, Resident Population Threat Targets, item 2
- ☐ Page 19, Resident Population Threat Targets, item 3
- ☐ Page 24, Summary question 3

Workers

- ☐ Page 19, Pathway Characteristics, active facility question
- ☐ Page 19, Resident Population Threat Targets, item 4

Air Pathway

Likelihood of release

- ☐ Page 21, Criteria List, suspected release?
- ☐ Page 22, Pathway Characteristics, suspected release question
- ☐ Page 22, Likelihood of Release, item 1 or 2
- ☐ Page 22, Column A or B

Primary targets

- ☐ Page 22, Likelihood of Release, item 1
- ☐ Page 22, Targets, item 3
- ☐ Page 22, Targets, item 5
- ☐ Page 22, Waste Characteristics, item 9a or 9b

Secondary targets

- ☐ Page 22, Pathway Characteristics, distance to nearest individual
- ☐ Page 22, Targets, item 4
- ☐ Page 22, Targets, item 5
- ☐ Page 23, PA Table 8

5.3 REVIEW OF AVAILABLE ANALYTICAL DATA

This guidance document has emphasized the need to exercise conservative judgments in the absence of definitive proof during the PA. Section 3.1 discusses limitations and potential pitfalls that may be associated with analytical data available to the PA. In general, whether analytical data are available or not, investigators should follow the guidelines in Section 3.1. However, comprehensive and reliable analytical data may be available for some sites. Upon completing the PA scoresheets, review available data to determine whether a more detailed approach can be employed. In brief, this can occur when the following two conditions hold:

- (1) The available data are equivalent in quality and comprehensiveness to data that would be obtained from an EPA-sponsored SI sampling program; and
- (2) The approach followed in Section 3.1 results in a further action recommendation that could be reversed by applying analytical data in place of standard PA conservative assumptions.

5.3.1 Rationale for the Standard PA Approach to Analytical Data

Three major areas of the HRS directly apply analytical data: substantiating or ruling out observed releases; substantiating or ruling out actual contamination of specific targets and differentiating between Level I or Level II; and determining substance-specific hazardous waste characteristics (e.g., toxicity, mobility, persistence, bioaccumulation potential). Recognizing that quality analytical data that definitively support these determinations are often not available at the PA, and consistent with streamlining the HRS for PA evaluations, the standard PA:

- ! Makes use of professional judgments to identify suspected releases and targets suspected to be exposed to actual contamination, and
- ! Builds in assumptions for waste characteristics and level of target contamination.

Releases and Target Contamination

Section 3.1 advises that PA investigators may always use analytical data indicating the presence of hazardous substances in environmental media or at specific targets to support hypotheses of suspected releases and primary targets. For PA purposes, such indications are sufficient to warrant a conservative judgment that a problem likely exists; documentation to HRS levels of certainty is not necessary.

Conversely, PA investigators may also always use analytical data in combination with qualitative knowledge of the site, site environs, and target characteristics, to support hypotheses that releases have not occurred and that there are no primary targets. However, PA investigators should not rely on analytical data alone to rule out the occurrence of releases or actual contamination of targets, unless those data are equivalent in quality and comprehensiveness to data that would be obtained from an EPA-sponsored SI (Section 5.3.2).

Differentiating Levels of Target Contamination

Caution is advisable when attempting to apply analytical data to differentiate between Level I and Level II actual contamination. The standard PA builds in an assumption that primary targets are contaminated at Level I. Even when analytical data are available, differentiating levels of contamination on the basis of a one-time sampling event may not be prudent if, for example, a determination of Level II contamination results in a NFRAP recommendation while Level I contamination would result in a further action recommendation (this can be a problem for SIs as

well as PAs). In such a case, conservative PA scoring at Level I is appropriate regardless of available analytical data, as further sampling may substantiate the higher level of contamination.

Waste Characteristics

In most cases it is prudent to assume maximum contaminant chemical properties and not evaluate specific substances and their associated characteristics. This conservative approach is often appropriate even when analytical data or qualitative knowledge of the hazardous substances likely to be associated with a site indicates otherwise. Ruling out the possibility of a hazardous substance with maximum contaminant properties implies that the site and its sources have been adequately sampled, and those samples have been adequately analyzed, to identify all hazardous substances associated with the site. Further, substance speciation, metabolites, degradation products, and impurities could be present that may be neither suspected by the PA investigator nor analyzed for by the laboratory. For example:

- ! The PA investigator may suspect that a dry cleaning or solvent recycling facility may have only handled solvents such as tetrachloroethane (PCA), tetrachloroethene (PCE), trichloroethane (TCA), and trichloroethene (TCE), which have HRS-assigned toxicity values ranging from 10 to 1,000. However, vinyl chloride, a degradation product of TCE, may also be present. Vinyl chloride has an HRS-assigned toxicity value of 10,000, the maximum (U.S. Environmental Protection Agency, 1991. Superfund Chemical Data Matrix (SCDM), May 10).
- ! File information and pre-existing analytical data may indicate that a particular wood treating site used pentachlorophenol (PCP), with an HRS-assigned toxicity value of 100, as its sole preservative agent. However, various forms of dioxin (with HRS-assigned toxicity values as high as 10,000) may also be present as impurities associated with the manufacture of PCP.

5.3.2 Assessing the Applicability of Available Analytical Data

Some available analytical data may be appropriate to allow more detailed evaluation to:

- ! Rule out the occurrence of a release
- ! Rule out actual contamination of specific targets
- ! Differentiate Level I and Level II contamination of targets
- ! Rule out the presence of a hazardous substance with maximum contaminant characteristics

An advantage to applying such data is the potential to screen out sites that do not warrant further investigation. Properly applied, the conservative approach of the standard PA will not result in inappropriate NFRAP recommendations (i.e., "false negatives"). However, it can result in some sites receiving further action recommendations that are later screened out of the Superfund process with the collection of quality analytical data. In some cases, the application of SI quality analytical data can demonstrate that a significant problem does not exist, thus obviating the need for an SI and permitting a confident NFRAP recommendation. Determining whether available data for a particular site are of sufficient quality and confidence to be applied as SI-generated data requires the professional judgment of an experienced reviewer.

The strategic approach to develop an SI sampling plan is discussed in EPA's "Guidance for Performing Site Inspections Under CERCLA, Interim FY 92" (OSWER Directive 9345.1-05); the site reviewer should be thoroughly familiar with this guidance. In brief, the sampling objectives of the SI are designed to answer the questions that the standard PA typically addresses via assumptions and professional judgment:

- ! What hazardous substances are associated with the site?
- ! Have releases occurred?
- ! Are specific targets contaminated by hazardous substances released from the site and, if so, what is the level of contamination?

For Superfund site assessment purposes, analytical data generated during an SI must confidently answer these questions. Analytical data available at the PA must also be sufficient to confidently answer these questions, if those data are applied to override the conservative assumptions of the standard PA approach. To be considered SI quality, existing analytical data must meet the following tests:

- ! Strategic value. The design of the sampling program must be similar to that for an SI, which typically includes sources, environmental media, and targets. It would be difficult to confidently evaluate hazardous substance contaminant characteristics if sources were not sampled; to confidently rule out the occurrence of a release if appropriate environmental media were not sampled; or to confidently rule out actual contamination of targets and differentiate between Level I and Level II if targets were not sampled.
- ! Comprehensiveness. Mere availability of analytical data, including source, environmental media, and target samples is not, in itself, sufficient. The extent of samples and sample locations also must be considered and must be compatible with an EPA-sponsored SI sampling plan for the site. Even if dozens of samples were collected, the site reviewer must consider, for example, whether:
 - Sources have been adequately sampled to confidently identify all hazardous substances or show no hazardous substances present.
 - The number and placement of environmental media samples are appropriate and adequate (e.g., depth of monitoring wells, probable points of entry to surface water, areas of evident surficial contamination) to detect or rule out the occurrence of a release.
 - Targets selected for sampling are appropriately identified as the most likely to be exposed to released substances.
- ! Analytical confidence. Analytical and QA/QC procedures employed by the laboratory must be known. Limited, rather than full-spectrum, analyses may not be adequate to identify all hazardous substances that may be present. Detection limits of laboratory equipment and methods, and the QA/QC procedures to validate the results, must also be of a sufficient level of confidence.
- ! Representativeness. The age of the data must be known and the site reviewer must consider whether the data are representative of current conditions. In the time since the site was sampled, releases may have occurred and hazardous substances may have migrated to targets.

5.3.3 Applying Analytical Data

If the site reviewer concludes that available analytical data are of SI quality, those data may be applied to override the standard PA evaluations of waste characteristics, releases, and target contamination. Note that, if the data do not meet all tests, their application may be limited and they may not necessarily be useful in all three categories. Also, remember that the standard PA approach is conservative; therefore it is not necessary to apply the more detailed scoring

evaluation if the data support the PA assumption of maximum waste characteristics and/or PA hypotheses of suspected releases and primary targets. Key questions are:

- ! Do the data rule out maximum waste characteristics?
- ! Do the data rule out a release?
- ! Do the data rule out actual contamination of targets?
- ! If the data support actual contamination of targets, do they rule out Level I contamination?

If the answer to one or more of these questions is "yes," applying the data in the same way as SI scoring could screen the site from further action. To do this, use the SI worksheets contained in EPA's "Guidance for Performing Site Inspections Under CERCLA, Interim FY 92" (OSWER Directive 9345.1-05).

Use SI worksheets and tables to record and evaluate analytical data regarding hazardous substance identification and contaminant characteristics, releases, and contamination of targets. Otherwise, the information requirements of the SI worksheets are the same as the PA scoresheets. Thus, aside from analytical data, the SI worksheets require no additional information beyond the standard PA scoresheets. The SI worksheets and tables are discussed in EPA's "Guidance for Performing Site Inspections Under CERCLA, Interim FY 92" (OSWER Directive 9345.1-05).

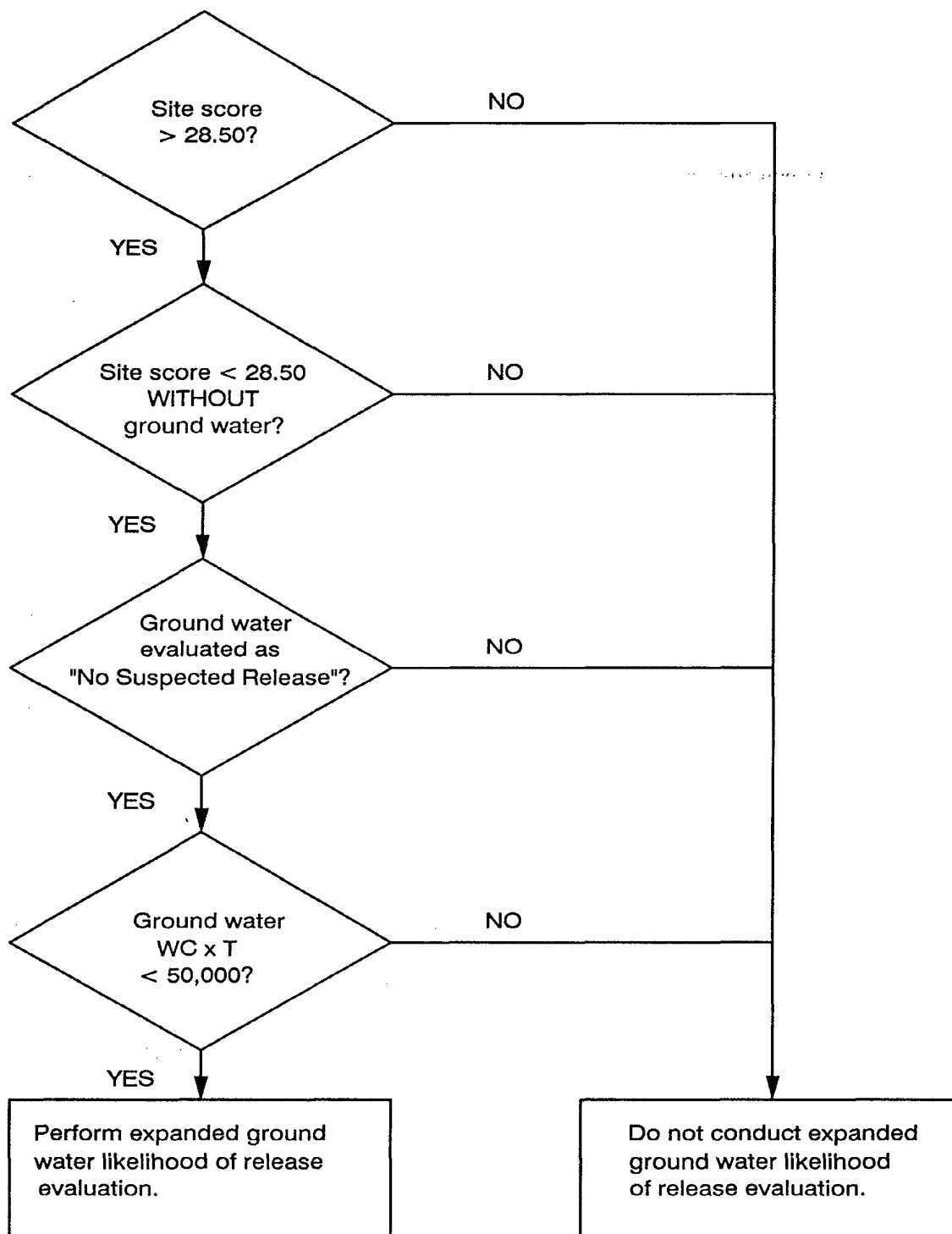
5.4 REVIEW OF GROUND WATER PATHWAY POTENTIAL TO RELEASE

A PA hypothesis of "no suspected release" is analogous to an HRS evaluation of potential to release. When a release to ground water is not suspected, the standard PA assigns a potential to release value on the basis of depth to aquifer. If depth to aquifer is 70 feet or less, a value of 500 is assigned; if greater than 70 feet, a value of 340 is assigned. In cases where the depth to aquifer is considerably greater than 70 feet, the assigned value of 340 may be too conservative and could result in an unnecessary recommendation for further investigation, whereas a more detailed evaluation could lead to a confident NFRAP recommendation.

The PA review should examine the ground water pathway evaluation to determine if a more detailed approach to potential to release is appropriate. Figure 5-1 presents a decision tree for the review process. The more detailed potential to release evaluation will only be useful when all four questions are answered with a "yes":

- ! Is the site score \geq 28.50? If the PA score is less than 28.50, the site receives a NFRAP recommendation and there is no benefit in pursuing a more accurate -- but lower -- potential to release value.
- ! Is the site score $<$ 28.50 without consideration of the around water pathway ? Calculate the PA site score using only the surface water, soil exposure, and air pathway scores. If the result is 28.50 or greater without considering the ground water pathway, a refined evaluation of ground water potential to release will not screen the site from further action.
- ! Is ground water evaluated on the basis of "no suspected release" ? Because a "no suspected release" evaluation is analogous to HRS potential to release, further evaluation of potential to release can only occur for sites where a release is not suspected. If, instead, the site investigator scored a suspected release for the ground water pathway, the question of potential to release is moot.

Figure 5-1
Decision Tree for Review of Ground Water Pathway Potential to Release



- ! Is the product of waste characteristics and targets (WC x T) less than 50,000? A refined evaluation of potential to release will only lower the pathway score sufficiently to result in a NFRAP recommendation if the product of waste characteristics and targets factor category scores is less than a minimum threshold. A product greater than 50,000 results in a NFRAP recommendation only if the potential to release score is less than 100. EPA's empirical analyses of HRS field test sites indicate that such low potential to release scores are very unusual; therefore, pursuing the more detailed evaluation of potential to release is not recommended unless the product of waste characteristics and targets is less than 50,000.

The more detailed evaluation of potential to release for sites that meet these conditions departs from the standard PA approach of a streamlined HRS evaluation and requires complete evaluation of all HRS potential to release factors for the ground water pathway -- with the exception of source containment. Containment need not be evaluated because very few CERCLIS sites consist entirely of perfectly contained sources.

For sites that meet the four conditions listed above, the PA investigator may evaluate potential to release factors according to Section 3.1.2 of the HRS (55 FR 51595, December 14, 1990). These factors are:

- ! Net precipitation
- ! Depth to aquifer
- ! Travel time, based on hydraulic conductivity and thickness of the layer of lowest hydraulic conductivity

The site investigator should also complete the standard PA scoresheets when applying this more detailed evaluation of ground water potential to release. As an attachment, include worksheets detailing the evaluation of the HRS potential to release factors. Also include a second completed ground water pathway scoresheet (page 8 of the PA scoresheets), inserting the calculated potential to release value, and a second completed site score calculation (page 24 of the PA scoresheets).